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**(54) Absorbent structure having multiple canals**

Absorbierender Gegenstand mit mehreren Kanälen

Structure absorbante comportant des canaux multiples

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<b>US-A- 3 954 107</b>	<b>US-A- 4 608 047</b>
<b>US-A- 4 758 241</b>	

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**Description**Background of the Invention

5 This invention relates to providing an article for absorbing body fluids. More particularly, this invention relates to an absorbent pad for use in products such as sanitary napkins, panty liners, diapers and the like.

In general, such products comprise one or more layers of a core of hydrophilic material such as wood pulp, rayon, tissue or the like. The hydrophilic material, generally fibrous in form, is provided as a pad having a rectangular or oblong shape or, in some cases, a shape designed to fit the anatomy of the wearer more closely. Such products may also be  
 10 designed to have wings or flaps, which extend transversely from the product and serve to protect the wearer's panty from becoming stained due to the tendency for body fluid to flow over the sides of the napkin. The pad is usually provided with an enveloping cover pervious to body fluids on the side of the pad which is to be placed against the body and impervious to such fluids on the side facing away from the body. The object of such a body fluid impervious cover is, of course, to protect the wearer's clothing from staining and wetting.

15 In general, such products have satisfactorily performed their function of absorbing and retaining body fluids and preventing staining and wetting of the wearer's clothing. When the product is properly placed and retained by the wearer in its intended position, body fluid is directed at or near the center of the product and distributes, by means of liquid wicking, radially from the point of deposition throughout the absorbent medium. However, sometimes the product is misplaced, or becomes saturated with use. Further, the width of the product is generally much smaller compared to the  
 20 length of the product. After striking the surface of the product, the fluid radiates approximately equally in all directions from the point of deposition. Thus, it tends to strike the longitudinal sides of the product before it travels toward the ends of the product, potentially causing staining at the sides before the full absorbent capacity of the product is utilized.

Sometimes, body fluid strikes the pad off-center and closer to the peripheral edges of the pad. If the body fluid strikes the pad off-center, the fluid tends to wick toward the side closest to which the fluids struck the pad and cause a  
 25 failure, i.e., the staining and wetting of the clothing of the wearer by body fluid. Such failures are known as "side failures".

There have been efforts in the past to direct the flow of fluid in a longitudinal direction in order to provide means to saturate the napkin longitudinally, rather than laterally. For example, U.S. Patent No. 4,524,474 (Svensson) describes an absorption pad for protecting a bed which includes a lower liquid impervious material layer and an upper liquid  
 30 absorbent material layer laminated to the lower layer. The liquid absorbent layer is impregnated with strings or filaments of a liquid-resistant agent which does not stiffen the pad. The strings form a grid-like pattern for defining compartments between the strings over the entire area of the absorption pad. However, a grid-like pattern would not be effective in a sanitary napkin or like product because such a pattern would not effect a longitudinal saturation without aiding a lateral saturation. Furthermore, strings or filaments would not prevent excessive seepage throughout the absorbent material.

35 Canadian Patent No. 803,531 (Ruffo) describes a pad having a moisture-proof wrapper which is corrugated into a series of alternate, parallel ridges and grooves extending lengthwise of the napkin. This moisture-proof wrapper is placed beneath the absorbent layer and acts as a series of troughs to guide the body fluid along the longitudinal axis. However, this moisture-proof wrapper appears only at the bottom of a fibrous absorbent layer, thus allowing the body fluid to continue to flow along the transverse axis of the absorbent material and over the sides of the napkin.

40 EP-A-0 130 848 discloses a sanitary napkin which consists of a central absorbent pad comprising a fluid permeable cover, a fluid impermeable backsheet and an absorbent core interposed between the cover and the backsheet, and flaps extending from each longitudinal edge of the central absorbent pad. The flaps attached to the central absorbent pad have the purpose to form a gasket-like seal between the body of the user and the sanitary napkin. No fluid controlling walls are provided in the absorbent core of the central pad or the flaps and both parts are not isolated from each  
 45 other.

DE-A-32 05 931 describes an absorbent napkin having an absorbent pad interposed between a fluid permeable sheet and a fluid impermeable sheet, wherein the absorbent pad has interruptions through which the upper and lower sheets are bonded to each other. Also in this case no isolation is provided at the interruptions between the adjacent portions of the absorbent material.

50 US-A-4 758 241 relates to a sanitary napkin which is formed of a plurality of vertically stacked layers including inter alia a fluid absorbing material. The fluid absorbing material is striated, such as by the use of a plurality of parallel seal lines. As evident from the reference, the parallel seal lines do not possess fluid controlling walls and cannot therefore provide any isolation between the adjacent parts of the fluid absorbing material.

55 U.S. Patent No. 3,954,107 (Chesky et al.) describes an absorbent article having side portions which define a longitudinally extending channel adjacent the lateral midpoint of the pad, the side portions separating during use to expose an increased area of the pad assembly. However, this type of assembly may prove awkward during use, as it is designed to separate and fail to remain integrated. This pad is also likely to deform, which increases the probability of product failure.

It is, therefore, an object of this invention to provide an absorbent product capable of controlling and directing flow

of body fluid so as to prevent failure at the sides and/or ends of the absorbent product.

Thus, it is an object of this invention to provide an absorbent product which is capable of directing body fluid to flow in longitudinal directions while substantially impeding the flow of such body fluid in transverse directions.

Another object of this invention is to provide an absorbent product which substantially prevents side failure.

It is yet another object of this invention to provide an absorbent product which may become largely saturated with body fluid without incurring side failure.

Another object of this invention is to provide a sanitary protection product which makes efficient use of the absorbent capacity of its absorbent element.

Yet another object of this invention is to provide a chambered sanitary protection product which substantially maintains its structural integrity during use.

### Summary of the Invention

The present invention provides an absorbent structure having a body-facing side and a garment-facing side, which comprises:

a) a fluid permeable cover on said body-facing side;

b) at least two abutted absorbent chambers formed by fluid controlling walls extending generally along the longitudinal axis of the napkin, said chambers containing absorbent material such that the absorbent material in each of said chambers is substantially isolated from the absorbent material in adjacent chambers, and that the fluid flow is directed substantially along the longitudinal direction of the structure.

It is the principle of the present invention to direct fluid flow substantially along the longitudinal direction of the product and substantially limit or prevent side failure by substantially preventing the flow of fluid across the transverse axis of the product. In the absorbent product of this invention, two or more "canals", or chambers, are provided within an absorbent element which act to separate the absorbent element into a plurality of separate longitudinal absorbent areas along the longitudinal axis of the absorbent element.

The absorbent areas are separated by fluid repellent areas. These fluid repellent areas may be formed by the moisture barrier layer, which can be nipped or molded and formed into U-shaped canals. Alternatively, the fluid repellent areas may be formed of fluid repellent material such as fluid repellent fibers, fiber webs, repellent tissue, polymeric foams or polymeric films arranged along the longitudinal axis of the absorbent element. The fluid repellent areas may include a relatively hydrophobic, or fluid repellent, cover or barrier material. Should a chamber become saturated with body fluid, the fluid will spill into the adjacent chamber.

Absorbent materials such as cellulose fiber, wood pulp, rayon, peat moss, pulp mixed with superabsorbent and the like may be placed in the canals to provide absorbent capacity. The absorbent element may be covered with a fibrous facing material, such as a non-woven fabric which aids in transmitting body fluid to the absorbent element. A clean, dry cover made of apertured polymeric film or repellent-treated fiber, which is hydrophobic and fluid permeable may also be used for this function. For example, an apertured film made in accordance with the teachings of U.S. Patent No. 4,690,679 (Mattingly et al.) may be used. Preferably, a hydrophilic, or wetting nonwoven layer of material may be bonded to such clean and dry cover in order to improve said cover's wicking capacity.

Other particular embodiments of the invention are set out in claims 2 - 16.

### Detailed Description of the Preferred Embodiments

Figure 1 depicts a cross-sectional view of a sanitary napkin 100 made in accordance with the principles of this invention. Sanitary napkin 100 is provided with a centrally located absorbent element 110 having generally longitudinally extending edges 120 and 125 and transversely extending ends 130 and 135. Sanitary napkin 100 has a garment-facing side 105 and a body-facing side 107. Absorbent element 110 is composed of a plurality of chambers 115 extending along the longitudinal axis of the napkin. Chambers 115 are formed by fluid repellent barrier 140.

Fluid repellent barrier 140 may be formed into said chamber-separation means by adhering the barrier into position with binder adhesive 150 between vertical spaces and then nipping repellent barrier 140. Repellent barrier 140 may be made of any polymeric film such as polyethylene, polypropylene, polyurethane or cellophane, or may be a normally fluid pervious material that has been treated to be impervious, such as a fluid repellent paper or silicone-treated paper, repellent-treated-fabrics, coated tissues, superabsorbent carriers, microporous films or apertured polymeric films. The barrier may also be made of fiber webs containing fluid repellent fiber.

In one preferred embodiment, the repellent barrier may be a coextruded polyethylene/ethylene-vinylacetate copolymer film (PE/EVA). This film may be heated to activate the EVA and then nipped with the EVA side facing toward the garment facing side of the napkin. The structure will adhere in the nipped shape, thus forming chambers without the use of adhesive. Binder adhesive 150 is also applied to the body facing surface 107 of repellent barrier in order to con-

tact and adhere to absorbent material placed in the chambers.

Materials other than polymeric film barriers and repellent non-woven facings may be used to create chambers in the absorbent products of this invention. For example, an insert strip of bonded 27.1 g/m<sup>2</sup> (0.8 oz/yd<sup>2</sup>) Hollofil\* (\*a Trademark of E.I. du Pont de Nemours) hollow fibers may be placed between the chambers. Fluid transfer is then controlled by the density and thickness of the Hollofil\* inserts. On the garment facing side of the absorbent element in such an embodiment, there should be located a moisture-proof barrier. Other materials useful as fluid repellent barriers include open cell foams (e.g. polyurethane), closed cell foams and microporous films.

Fluid repellent barrier 140 may be formed into a U-shaped middle chamber and one or more additional barriers may be added which are formed into larger U-shapes which are nested concentrically and arranged such that additional chambers are formed between the arms of the "U's". In such a configuration, the largest "U" forms an impervious barrier on the undergarment-facing side of the pad.

Binder adhesive 150 may be any of a large number of pressure-sensitive tack hot melt adhesives, thermosetting adhesives, cold glue adhesives or the like that are commercially available, including styrene/ethylene/butylene/styrene (SEBS) block terpolymers, styrene-isoprene-styrene copolymers and the like. Examples of hot melt adhesives useful as binder adhesives in the products of this invention are: Fuller HM-3350-C, available from the H.B. Fuller Co., hot melt adhesive containing amorphous polypropylene and hydrocarbon tackifiers (viscosity 3800 ± 950 cps at 149°C (300°F), density 0.88g/cc at 22°C (70°F), softening range 1065°C ± 11°C (1950° ± 20°F) applicator temperature 135°C to 163°C (275°F to 325°F)). Eastobond A337S (available from Eastman Chemical Products, Inc.), having an amorphous polypropylene base coated with polyethylene to facilitate handling (viscosity 1500 ± 400 cps at 177°C (350°F), density 0.90 ± 0.01g/cc at 23°C (73°F), softening range 98°C ± 7°C to 17°C (208°F ± 12°F - 30°F) and applicator temperature 135°C to 163°C (275 - 325°F)); National Starch 5432-119-I (available from National Starch & Chemical Corp.), having a viscosity of 2135 cps at 149°C (300°F), a softening point of 60°C (139°F) and an applicator temperature of 121°C to 177°C (250-350°F); and the like. Cold glue polyvinyl acetate-based adhesives are also useful. Binder adhesive may be applied in the form of longitudinal lines, sprays, spots, squares, transverse lines or any other suitable pattern.

High density absorbent material 160 may be placed at the bottom of each chamber 115 in order to provide a reservoir for holding absorbed body fluid. High density absorbent material 160 which may contain superabsorbent or peat moss or like material to aid in absorbing may be a densified wood pulp board, a densified pulp-polyethylene mixture, highly absorbent tissue impregnated with superabsorbent, cardboard or pulp fluff board which has been crushed to make it more flexible; a densified, compacted, porous, absorbent, fibrous layer having a particulate hydrocolloid material distributed therein such as described in U.S. Patent No. 4,217,901, issued August 19, 1980 (Bradstreet et al.) or the like. Low density absorbent material 165 such as cellulose fibers, wood pulp, pulp/polyester mixtures or the like is placed in each chamber 115 closer to the body facing side 107 of the napkin in order to wick body fluid away from the surface of the napkin.

Low density absorbent material 165 may be low density loosely associated cellulose fibers, e.g. wood pulp fluff, regenerated cellulose, cotton fibers or bicomponent fusible fibers having an outer core which melts at relatively lower temperatures and an inner core which melts at higher temperatures. Such fibers may be chemically or physically modified and the absorbent element may include such fibers in combination with other materials, both natural and synthetic, such as hydrophilic foams, hydrophilic polymers or the like. Wood pulp is frequently the material of choice primarily because it is inexpensive and readily available.

Cover 170 surrounds absorbent element on the body facing side of the napkin and wraps around the longitudinal edges of the absorbent element and partially under the repellent barrier. Alternatively, cover 170 may surround the entire absorbent element so as to completely encase it. Cover 170 may also be folded between the chambers to form barriers, as shown in Figure 6. Cover 170 may be any of the well known cover materials used in sanitary protection products, including, for example, nonwoven fabrics of cellulose, regenerated cellulose, polyester or other synthetic polymers. Additionally, polymeric film or films having apertures therethrough to render the materials pervious to fluids may also be employed. One cover material is a fabric containing a blend of pulp and fusible fibers such as heat bondable polyester/polyethylene conjugate fibers.

Laminating adhesive 180, which may be a hot melt adhesive, is placed along longitudinal lines under the repellent barrier and cover fabric to adhere the repellent barrier and cover fabric to a moisture-impermeable barrier 190. Alternatively, a non-woven cover fabric may be wrapped around the entire absorbent structure to maintain its integrity without the need for an additional barrier 190. Barrier 190 may be polyethylene or similar polymeric moisture-resistant material or a nonwoven fabric which has been treated to render it moisture-impermeable.

Positioning adhesive 195 is placed along longitudinal lines or in any suitable pattern on the garment facing side of the absorbent body to aid in positioning the absorbent body on an undergarment. Positioning adhesive 195 may be a pressure sensitive hot melt adhesive. Release paper 197 protects the positioning adhesive 195 prior to use by the wearer.

Longitudinal chamber walls 115 may be spaced from between about 3 mm (1/8 inch) apart to about 50 mm (2 inches) apart. Most preferably they are about 12.7 mm (1/2 inch) apart. In other embodiments, there may be a relatively wide chamber located in the center of the napkin and narrower chambers on either side of the central chamber. The

width between chamber walls may be exactly the same as the width between other chamber walls along the transverse axis of the napkin or it may be varied with respect to the width of other canals. Of course, the chambers need not be linear, but may be arranged in any pattern conducive to achieving the generally longitudinal flow of fluid in the product.

In another embodiment, a controlled release of fluid from the center of the absorbent may be achieved by placing absorbent material having successfully greater hydrophobicity, or fluid repellancy, in the chambers adjacent the central chambers.

The surface of the chamber separation means closest to the body facing surface of the napkin should effect a segmentation of the absorbent material of the napkin. This discourages fluid transfer between canals along the transverse axis of the napkin. Thus, fluid is encouraged to flow along the longitudinal axis of the absorbent material without spilling over or transferring into adjacent canals.

FIGURE 3 depicts another preferred embodiment of the absorbent products of this invention. In FIGURE 3, the cover material has been removed to permit the viewing of an absorbent element containing low density absorbent material 265 in the central portion chambers 215. Located in chambers 215 toward longitudinal ends 300 and 305 is superabsorbent material 273 which may be composed of low density absorbent material with natural or manufactured superabsorbent such as peat moss, polymeric material or the like.

FIGURES 4 and 5 depict another preferred embodiment of this invention. The sanitary napkin depicted in FIGURE 4 contains three chambers 415. These chambers are separated by a cover 470. Chambers 415 are filled with low density absorbent material 465. Cover 470 is more fluid repellent than low density absorbent material 465. Cover 470 may be made of any material known to be useful in sanitary protection products. For example, nonwoven fabrics which have been treated to render them relatively hydrophobic in comparison with the low density absorbent material may be used, as well as synthetic polymer films having apertures. As long as the cover is less hydrophilic than the absorbent material, the fluid is more apt to wick along the absorbent. When saturated, the cover wall allows controlled release of fluid to the next chamber. The release action from chamber to chamber is controlled by the difference in hydrophobicity between the absorbent and the wall, and by the thickness of the wall. Cover 470 completely surrounds the absorbent element and keeps it unified. The double fold of cover is bonded together to prevent separation along the fold.

FIGURE 6 depicts another preferred embodiment of the products of this invention. Chambers 615, 617 and 619 are separated by cover 670 in a manner similar to that of FIGURE 5. Fluid striking the napkin will tend to fill chambers 615 and 617 before radiating to chamber 619, which surrounds chambers 615 and 617. The curved shape of the chamber prevents unfolding between the inner chambers and chamber 619. Chamber 619 may contain absorbent material which is slightly more fluid-repellent than that of chamber 615 and 617. Alternatively, chambers 615 and 617 may be combined into one chamber. This construction would discourage the fluid from migrating to chamber 619, which is adjacent to the body and undergarments of the wearer. Alternatively, chamber 619 may contain low density absorbent material and superabsorbent, which would tend to prevent the fluid from leaking out of the napkin.

In an alternative embodiment, chambers 615, 617 and 619 may be separated by an impermeable barrier layer below the absorbent element, or by a relatively hydrophobic barrier wall. The following examples illustrate the concepts and products of this invention. However, they merely serve to illustrate and not to limit the scope of the invention.

#### Example 1

Three experimental multiple canal sanitary napkin products were fabricated in accordance with the teachings of this invention. Control napkins, commercially available as SURE & NATURAL brand sanitary napkins, were tested in addition to napkins made according to this invention. A first experimental product (A) was fabricated with four canals which were 16 mm (0.625 inch) apart. Experimental product (B) was fabricated with five canals which were 12.7 mm (0.500 inch) apart. Experimental product (C) was made with eight canals each of which was 8 mm (0.3125) inches wide. The control product consisted of a 64 mm (2.5 inches) wide absorbent structure having a polyethylene boat

enwrapping the absorbent pad. A test apparatus was used to analyze all of the sanitary napkin products. This consisted of a fast dynamic fluid capacity analyzer was used to measure the absorbency performance of sanitary napkin products in a simulation to *in vivo* usage conditions. Each of the sample napkins was suspended across a rubber mold which simulates the female form. The form was set into motion by means of a set of gears, cams, and rods and an ersatz menstrual fluid containing 1% sodium chloride, by weight, was allowed to drip onto the napkin to simulate in-use conditions. The fluid was applied at a rate of 15.2 cc/cycle and the form was operated at a speed of 1.0 cycles/minute. The fluid capacity of the napkin under dynamic conditions was measured by the total volume of fluid applied at the time of failure, i.e., the time at which the spotting was noted on the underside of the napkin. The fluid was dispensed to the sanitary napkin product at approximately a 90° angle to the body facing surface of the pads until failure occurred at the sides of the product.

The results of this dynamic laboratory test are shown in Table I below. The data in Table I demonstrate a cubic centimeters of ersatz menstrual fluid which was contained in each pad prior to failure. The experimental 16 mm (0.625 inch) canals had an 11% absorbency increase over the control product. The 12.7 mm (0.5 inch) canals had a 33% absorbency increase over the control product. The 8 mm (0.3125 inch) canals had a 22% absorbency increase over the control

samples. The data shows that the most preferable spacing for a 64 mm (2.5 inches) width product is 12,7 mm (0.5 inch) between canals.

#### Example 2

Sanitary napkin products containing three longitudinal chambers were fabricated in accordance with the teachings of this invention. The middle chamber contained low density wood pulp and polyester binder fiber. The side chambers were made from fused Hollofil fibers rolled along the longitudinal direction and coated with polyacrylic acid superabsorbent. The cover was an apertured fiber cover sprayed on the product-facing side for adhesion to the absorbent element.

These products were tested to observe absorbency using ten panelists. Each panelist used the tri-chambered napkins during one month and STAYFREE brand Maxipads the following month. The pads were worn for five hours or until failure. The results of this test are set forth in Table II. The results show that the chambered napkins significantly reduced the rate of failure as compared to the non-chambered napkins.

#### Example 3

Sanitary napkin products were fabricated in accordance with the teachings of this invention containing three longitudinal chambers filled with low density wood pulp and polyester binder fiber. Nonwoven cover material made from polyester and rayon was used to form chamber walls dividing the chambers. The cover was more fluid repellent than the pulp. The middle chamber of each absorbent was about 38 mm (1 1/2 inches) across the transverse width. The chambers on either side of the middle chamber were about 12,7 mm (1/2 inch) in width. Eleven women were asked to wear the chambered napkins during their menstrual periods, in the days of the heaviest flow for a period of 5 hours, or until failure. The following month, the same eleven women were asked to wear STAYFREE brand maxipads under the same conditions to provide a comparison. The results of these tests are set forth in Table III. The results of these tests show that the frequency of daytime failures was diminished when the chambered napkins were used. In addition, the chambered napkins of this invention produced less severe stains on panties when failure occurred.

#### Example 4

The 12,7 mm (0.500") chambered napkin of Example 1 was tested as in Example 3. The results of this test are set forth in Table IV. Both the SURE AND NATURAL brand napkins and the chambered napkins of this invention evidenced a failure rate higher than 40% under the conditions of the test. Due to the light flow rate of the women tested (0.75 g/hr. and 0.09 g/hr), the menstrual fluid apparently wicked along the cover of the napkins and did not reach the absorbent element of the pads. The stains produced were predominantly "light smears", indicative of failures caused by cover wicking, rather than by lack of absorbent capacity.

TABLE I

PRODUCT DYNAMIC CAPACITY PRIOR TO FAILURE (cc/PAD)				
Test No.	Chamber Width			
	Control	16mm (0.625")	12,7mm (0.500")	8mm (0.3125")
1	30.41	22.95	40.20	31.31
2	24.86	23.57	39.61	31.30
3	21.71	20.99	29.58	30.20
4	31.35	31.85	36.10	27.63
5	23.78	29.62	26.51	33.08
6	22.26	27.82	39.95	
7	22.02	26.15	29.00	
8	22.55	35.23	25.16	
9	23.37	28.48	24.98	
10	29.15	31.48	42.25	
Mean (x)	25.15	27.81	33.33	30.70



TABLE II

	Chambered Napkins	STAYFREE brand Maxi- pads
Total Daytime Napkins	77	89
Average add-on wgt. (g)	7.35	7.98
Average time worn (hours)	4.50	4.42
Average flow rate (g/hr.)	1.76	2.32
Daytime Failures	34 (44%)	51 (57%)
Avg. failure capacity (g)	7.83	10.34
Avg. time worn at failure (hours)	4.23	4.29
No. of failures	≤ 2 g	5
	≤ 6 g	17
	≤ 12 g	28
No. of failures	≤ 1 hr.	0
	≤ 2 hrs.	1
	≤ 3 hrs.	1
	≤ 4 hrs.	5
	≤ 5 hrs.	14
Failure type		
Side Only	19	21
End Only	14	16
Combination (side and end)	3	12
Panelists with failures ≤ 4 hrs.	6	8
No. of panelists with reduced failure	7	4
Stain Intensities		
Light smear	25	33
Light stain	3	11
Moderate stain	2	5

TABLE III

		STAYFREE Maxipads	Chambered Napkins
Total Daytime Napkins		75	68
Avg. add-on weight (g)		6.15	7.23
Avg. time worn (hrs.)		4.33	4.61
Avg. flow rate (g/hr.)		1.68	1.94
Daytime failures		47 (62.67%)	21 (30.88%)
Avg. time worn (hrs.) of failed napkin		6.97	8.80
Avg. failure capacity		4.31	4.49
No. of failures	≤ 2 g.	5	4
	≤ 6 g.	25	11
	≤ 12 g.	42	15
No of failures	≤ 1 hr.	0	1
	≤ 2 hrs.	4	3
	≤ 3 hrs.	7	7
	≤ 4 hrs.	17	8
	≤ 5 hrs.	35	15
Failure type			
Side Only		19	11
End Only		18	5
Combination (Side & End)		1	5
Panelists with failures at ≤ 4 hrs.		7	4
No of panelists with reduced failure		1	8
Stain Intensities			
Light Smear		33	15
Light Stain		12	2
Moderate Stain		2	4

TABLE IV

		SURE & NATURAL	Chambered Napkins
Total Daytime Napkins		39	39
Avg. capacity (g)		3.08	3.28
Avg. time worn (hrs.)		4.94	4.93
Avg. flow rate (g/hr.)		0.75	0.90
Daytime Failures		16 (41.0%)	19 (48.7%)
Avg. failure capacity		3.18	3.87
No. of failures	≤ 2 g.	4	8
	≤ 4 g.	8	3
	≤ 8 g.	3	7
	≤ 12 g.	1	1
No of failures	≤ 2 hr.	4	3
	≤ 4 hrs.	5	5
	≤ 6 hrs.	5	11
	≤ 8 hrs.	2	0
Failure type			
Side Only		10	8
End Only		2	3
Combination (Side & End)		4	8
Panelists with failures at ≤ 4 hrs.		12	11
Stain Intensities			
Light Smear		14	14
Light Stain		2	5
Moderate Stain		0	0

## Claims

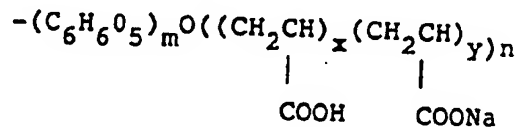
1. An absorbent structure having a body-facing side and a garment-facing side, which comprises:

- a) a fluid permeable cover on said body-facing side;

- b) at least two abutted absorbent chambers characterised in that said chambers are formed by fluid controlling walls extending generally along the longitudinal axis of the napkin, said chambers containing absorbent material such that the absorbent material in each of said chambers is substantially isolated from the absorbent material in adjacent chambers, and that the fluid flow is directed substantially along the longitudinal direction of the structure.

2. An absorbent structure according to claim 1 wherein said chambers are formed by fluid controlling walls selected from the group consisting of nonwoven moisture impermeable fiber, moisture impermeable polymeric film, a repellent-treated fabric, repellent-treated tissue, moisture repellent fiber web, superabsorbent barrier or polymeric foam.

3. An absorbent structure according to claim 2 wherein said fluid controlling walls comprise a moisture impermeable polymeric film selected from the group consisting of impermeable dense polymeric film, microporous film or apertured polymeric film.
- 5 4. An absorbent structure according to claim 3 wherein said impermeable polymeric film comprises a lower polyolefin film.
5. An absorbent structure according to claim 2 wherein said repellent treated tissue comprises silicone-coated cellulose tissue.
- 10 6. An absorbent structure according to claim 2 wherein said moisture repellent fiber web comprises a nonwoven web of bicomponent fibers.
7. An absorbent structure according to claim 2 wherein said nonwoven fluid controlling wall is selected from the group consisting of polyester, rayon, lower polyolefin, acrylic fibers, repellent treated tissue, meltblown web, microporous film or a combination of said materials.
- 15 8. An absorbent structure according to claim 2 wherein said polymeric foam comprises polyurethane.
9. An absorbent structure according to claim 2 wherein said wall comprises a nonwoven cover material having a basis weight of at least 10,1 g/m<sup>2</sup> (0.3 oz/yd<sup>2</sup>).
- 20 10. An absorbent structure according to claim 1 wherein said absorbent material comprises wood pulp fluff, regenerated cellulose, cotton fibers, peat moss or a combination thereof.
- 25 11. An absorbent structure according to claim 1 wherein said absorbent material comprises high density absorbent located adjacent the garment-facing side of the absorbent structure and low density absorbent adjacent the body-facing side of the absorbent structure.
- 30 12. An absorbent structure according to claim 11 wherein said high density absorbent comprises wood pulp fluff and superabsorbent having a density of at about 0.10-0.50 g/cc.
13. An absorbent structure according to claim 12 wherein said density is between about 0.20-0.35 g/cc.
- 35 14. An absorbent structure according to claim 12 wherein said superabsorbent comprises starch grafted polyacrylate powder having the formula:



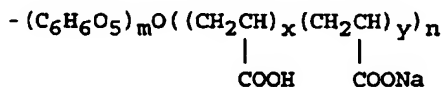
- 45 15. An absorbent structure according to claim 11 wherein said low density absorbent comprises wood pulp fluff, regenerated cellulose, rayon, cotton or a combination thereof.
- 50 16. An absorbent structure according to claim 3 wherein said film comprises two adjacent layers comprising a layer of ethylene-vinylacetate film and a layer of polyethylene film wherein said ethyl vinyl-acetate film is located on the garment facing side of the absorbent structure.

#### Patentansprüche

- 55 1. Absorbierende Struktur mit einer körperzugewandten Seite und einer der Unterwäsche zugewandten Seite, umfassend:
  - a) eine flüssigkeitsdurchlässige Abdeckung auf der dem Körper zugewandten Seite;

b) mindestens zwei angrenzende absorbierende Kammern, dadurch gekennzeichnet, daß die Kammern durch sich im allgemeinen entlang der Längsachse der Binde erstreckende, flüssigkeitskontrollierende Wände gebildet werden, wobei die Kammern ein absorbierendes Material in der Weise enthalten, daß das absorbierende Material in jeder der Kammern im wesentlichen gegen das absorbierende Material der benachbarten Kammern isoliert ist und der Flüssigkeitsstrom im wesentlichen entlang der Längsrichtung der Struktur dirigiert wird.

2. Absorbierende Struktur nach Anspruch 1, wobei die Kammern durch flüssigkeitskontrollierende Wände gebildet sind, die aus der Gruppe ungewebte, feuchtigkeitsundurchlässige Fasern, feuchtigkeitsundurchlässige, polymere Filme, abstoßend ausgerüstete Stoffe, abstoßend ausgerüstetes Seidenpapier (tissue), abstoßend ausgerüstete Faserbahnen, superabsorbierende Sperren oder polymere Schaumstoffe ausgewählt sind.
3. Absorbierende Struktur nach Anspruch 2, wobei die flüssigkeitskontrollierenden Wände einen feuchtigkeitsundurchlässigen polymeren Film umfassen, der aus der Gruppe undurchlässige, dichte polymere Filme, mikroporöse Filme oder mit Öffnungen versehene polymere Filme ausgewählt ist.
4. Absorbierende Struktur nach Anspruch 3, wobei der undurchlässige polymere Film einen unteren Polyolefinfilm umfaßt.
5. Absorbierende Struktur nach Anspruch 2, wobei das abstoßend ausgerüstete Seidenpapier, mit Silicon beschichtetes Cellulose-Seidenpapier umfaßt.
6. Absorbierende Struktur nach Anspruch 2, wobei die feuchtigkeitsabstoßende Faserbahn eine ungewebte Bahn aus zweikomponentigen Fasern umfaßt.
7. Absorbierende Struktur nach Anspruch 2, wobei die ungewebte, flüssigkeitskontrollierende Wand aus der Gruppe Polyester, Rayon, niedere Polyolefine, Acrylfasern, abstoßend ausgerüstetes Seidenpapier, Schmelzblasbahnen, mikroporöse Filme oder Kombinationen dieser Materialien ausgewählt ist.
8. Absorbierende Struktur nach Anspruch 2, wobei der polymere Schaum Polyurethan umfaßt.
9. Absorbierende Struktur nach Anspruch 2, wobei die Wand ein ungewebtes Abdeckmaterial mit einem Basisgewicht von mindestens 0,9 g/cm<sup>2</sup> (0,3 oz/yd<sup>2</sup>) umfaßt.
10. Absorbierende Struktur nach Anspruch 1, wobei das absorbierende Material flockigen Holzstoff, regenerierte Cellulose, Baumwollfasern, Torfmoos (peat moss) oder eine Kombination davon umfaßt.
11. Absorbierende Struktur nach Anspruch 1, wobei das absorbierende Material ein Absorptionsmittel hoher Dichte neben der der Unterwäsche zugewandten Seite der absorbierenden Struktur und ein Absorptionsmittel geringer Dichte neben der der körperzugewandten Seite der absorbierenden Struktur enthält.
12. Absorbierende Struktur nach Anspruch 11, wobei das Absorptionsmittel hoher Dichte flockigen Holzstoff und superabsorbierendes Material mit einer Dichte von etwa 0,10-0,50 g/cm<sup>3</sup> umfaßt.
13. Absorbierende Struktur nach Anspruch 12, wobei die Dichte etwa 0,20-0,35 g/cm<sup>3</sup> beträgt.
14. Absorbierende Struktur nach Anspruch 12, wobei das superabsorbierende Mittel mit Stärke gepropftes Polyacrylatpulver der folgenden Formel umfaßt:



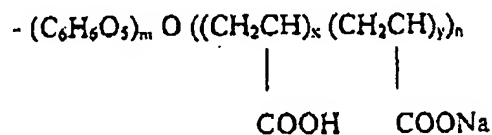
15. Absorbierende Struktur nach Anspruch 11, wobei das Absorptionsmittel geringer Dichte flockigen Holzstoff, regenerierte Cellulose, Rayon, Baumwolle oder eine Kombination davon umfaßt.

16. Absorbierende Struktur nach Anspruch 3, wobei der Film zwei benachbarte Schichten umfaßt, die eine Schicht aus einem Ethylen-Vinylacetat-Film und ein Schicht aus einem Polyethylenfilm umfaßt, wobei der Ethylen-Vinylacetat-Film sich auf der der Unterwäsche zugewandten Seite der absorbierenden Struktur befindet.

5 **Revendications**

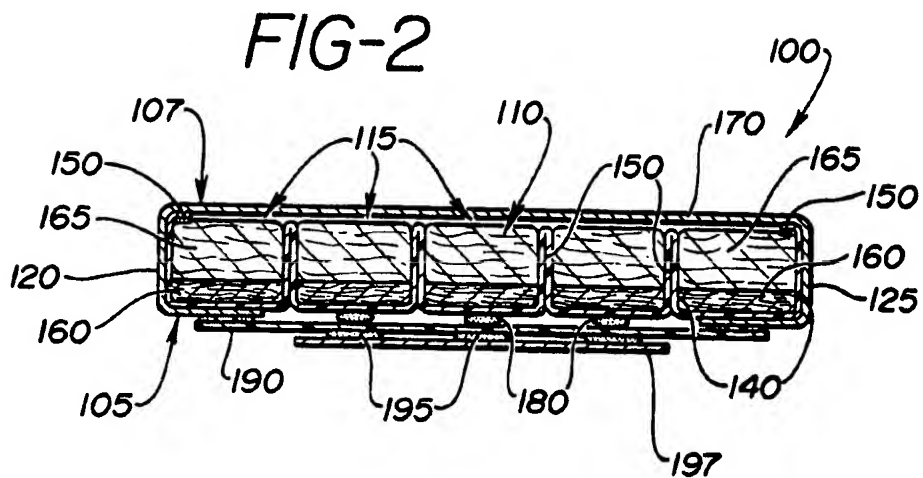
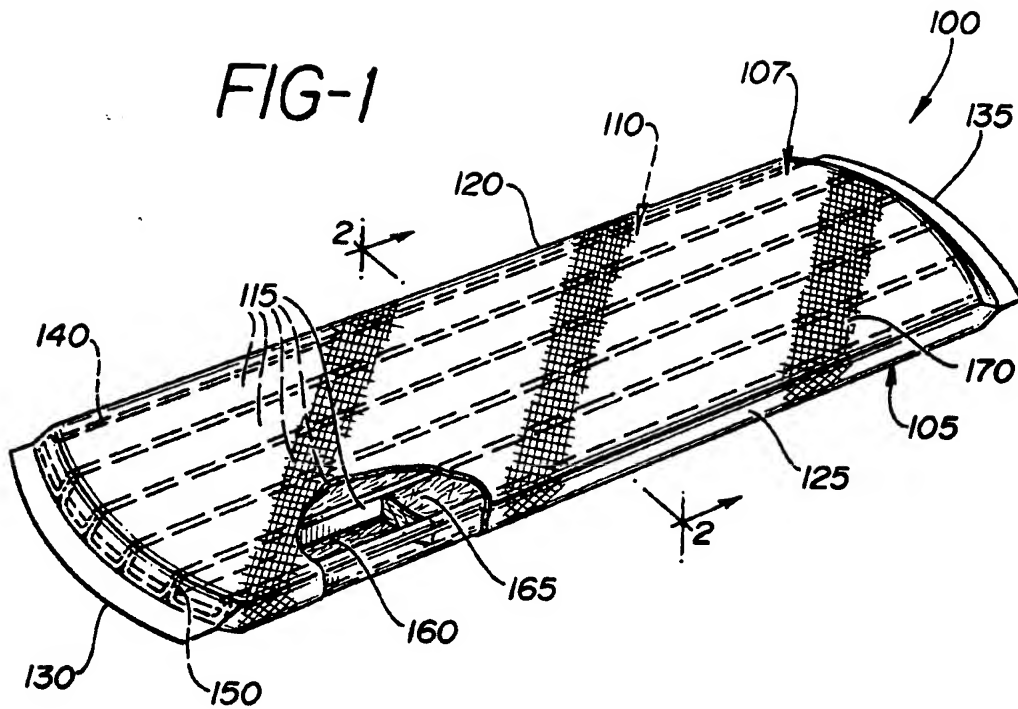
1. Une structure absorbante présentant un côté faisant face au corps et un côté faisant face au sous-vêtement, qui comprend :
  - 10 a) une feuille de recouvrement perméable au fluide sur ledit côté faisant face au corps :
  - b) au moins deux chambres absorbantes attenantes, caractérisée en ce que lesdites chambres sont formées par des parois de contrôle du fluide s'étendant généralement le long de l'axe longitudinal de la serviette, lesdites chambres contenant du matériau absorbant tel que le matériau absorbant de chacune des dites chambres est substantiellement isolé du matériau absorbant des chambres adjacentes et que l'écoulement du fluide est dirigé substantiellement le long de la direction longitudinale de la structure.
- 15 2. Une structure absorbante selon la Revendication 1, dans laquelle lesdites chambres sont formées par des parois de contrôle du fluide sélectionnées parmi le groupe composé de fibre non tissée imperméable à l'humidité d'un film polymère imperméable à l'humidité, d'une étoffe traitée pour être imperméable, d'un tissu traité pour être imperméable, d'un tissu de fibre imperméable à l'humidité, d'une barrière superabsorbante ou d'une mousse polymère.
- 20 3. Une structure absorbante selon la Revendication 2, dans laquelle lesdites parois de contrôle du fluide comprennent un film polymère imperméable à l'humidité sélectionné parmi le groupe composé d'un film polymère imperméable dense, d'un film microporeux ou d'un film polymère à trous.
- 25 4. Une structure absorbante selon la Revendication 3, dans laquelle ledit film polymère imperméable comprend un film en polyoléfine inférieure.
- 30 5. Une structure absorbante selon la Revendication 2, dans laquelle ledit tissu traité pour être imperméable comprend un tissu de cellulose revêtu de silicone.
- 35 6. Une structure absorbante selon la Revendication 2, dans laquelle ledit tissu de fibre imperméable à l'humidité comprend un tissu non tissé de fibres à deux composants.
- 40 7. Une structure absorbante selon la Revendication 2, dans laquelle ladite paroi non tissée de contrôle du fluide est sélectionnée parmi le groupe composé de polyester, de rayonne, de polyoléfine inférieure, de fibres acryliques, d'un tissu traité de façon à être imperméable, d'un tissu thermosoufflé, d'un film microporeux ou d'une combinaison des dits matériaux.
8. Une structure absorbante selon la Revendication 2, dans laquelle ladite mousse polymère comprend du polyuréthane.
- 45 9. Une structure absorbante selon la Revendication 2, dans laquelle ladite paroi comprend un matériau de recouvrement non tissé présentant un grammage au moins égal à 0,1 g/cm<sup>2</sup> (0,3 oz/yd<sup>2</sup>).
10. Une structure absorbante selon la Revendication 1, dans laquelle ledit matériau absorbant comprend de la peluche de cellulose technique, de la cellulose régénérée, des fibres de coton, de la tourbe ou une combinaison de ceux-ci.
- 50 11. Une structure absorbante selon la Revendication 1, dans laquelle ledit matériau absorbant comprend un matériau absorbant de densité élevée adjacent au côté faisant face au sous-vêtement de la structure absorbante, et un matériau absorbant de faible densité adjacent au côté faisant face au corps de la structure absorbante.
- 55 12. Une structure absorbante selon la Revendication 10, dans laquelle ledit matériau absorbant de densité élevée comprend de la peluche de cellulose technique et un matériau superabsorbant présentant une densité environ comprise entre 0,10 et 0,50 g/cc.
13. Une structure absorbante selon la Revendication 11, dans laquelle ladite densité est comprise entre environ 0,20 et 0,35 g/cc.

14. Une structure absorbante selon la Revendication 11, dans laquelle ledit matériau superabsorbant comprend de la poudre de polyacrylate greffée avec de l'amidon, présentant la formule:



15. Une structure absorbante selon la Revendication 11, dans laquelle ledit matériau absorbant de faible densité comprend de la peluché de cellulose technique de la cellulose régénérée, de la rayonne, du coton, ou une combinaison de ceux-ci.

16. Une structure absorbante selon la Revendication 3, dans laquelle ledit film comprend deux couches adjacentes comprenant une couche d'un film d'éthylvinylacétate et une couche d'un film de polyéthylène, dans laquelle ledit film d'éthylvinylacétate est situé sur le côté faisant face au sous-vêtement de la structure absorbante.





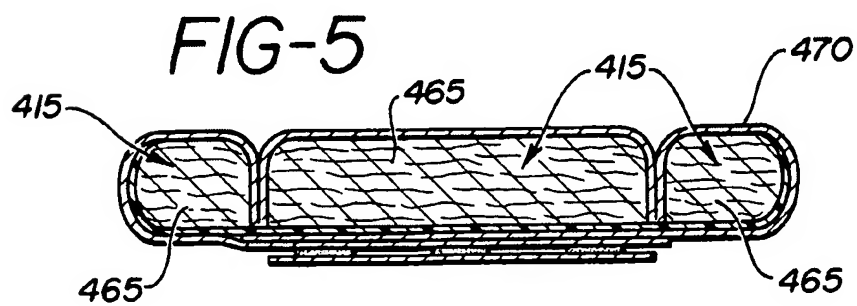
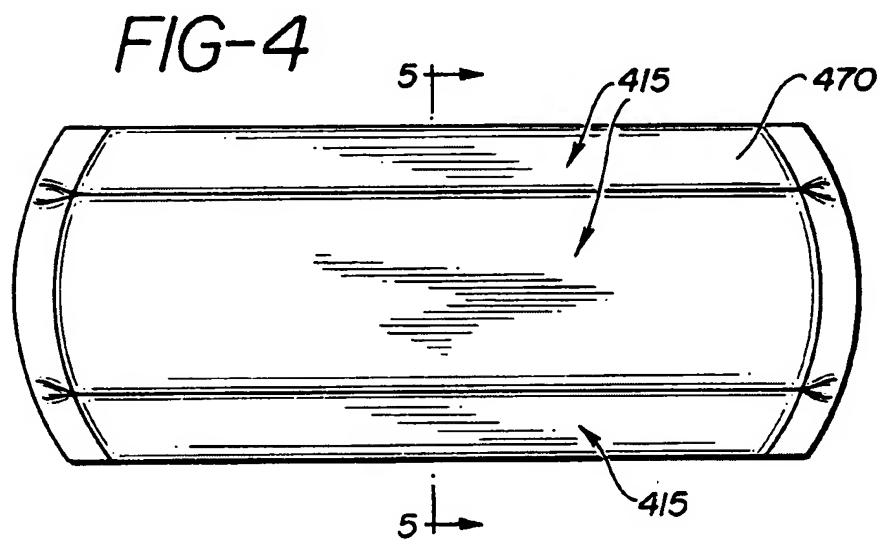
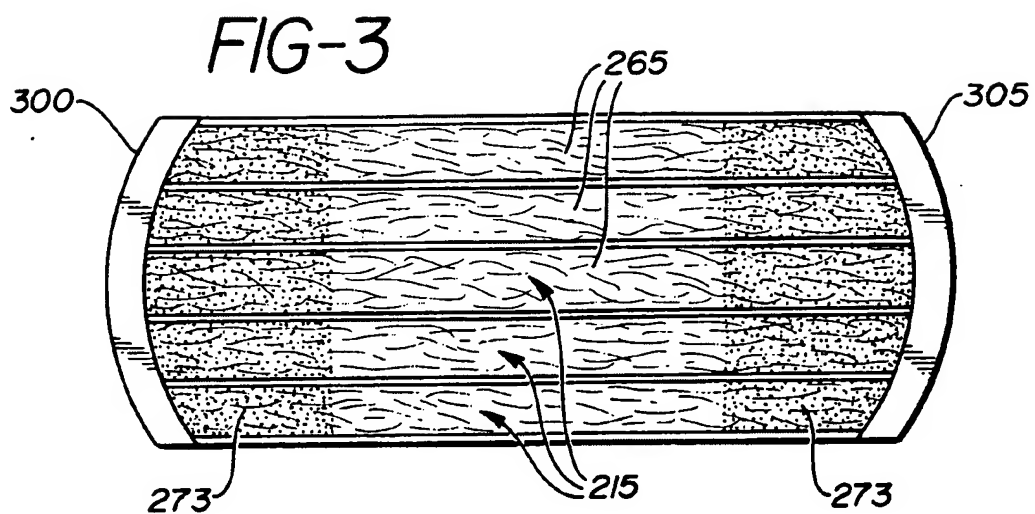


FIG-6

